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[SECOND SERIES.]

"..... per litora spargite muscum,
Naiades, et circùm vitreos considite fontes :
Pollice virgineo teneros hìc carpite flores :
Floribus et pictum, divæ, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas ;
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Deæ pelagi, et pingui conchylia succo."
N. Parthenii Glannettasii Ecl. 1.

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I.—*Account of a Ribbon Fish* (Gymnetrus) *taken off the coast of Northumberland.* By Albany Hancock and Dennis Embleton, M.D.*

[With two Plates.]

On the 26th of March, 1849, a fine specimen of a species of *Gymnetrus*, or Ribbon Fish, was captured by Bartholomew Taylor and his two sons, the crew of a fishing coble belonging to Cullercoats. It was found at about six miles from shore, and in from twenty to thirty fathoms water. The men having started from their fishing ground to return homewards, observed at a little distance what appeared to be broken water; the old man being struck with such a novelty directed his lads to pull towards it; on nearing the spot they perceived a large fish lying on its side on the top of the water. The fish as they approached it righted itself, and came with a gentle lateral undulating motion towards them, showing its crest and a small portion of the head occasionally above water; when it came alongside, one of them struck it with his picket—a hook attached to the end of a small stick, and used in landing their fish; on this it made off with a vigorous and vertical undulating motion, and disappeared, Taylor says, as quick as lightning under the surface. In a short time it

* Read at the Anniversary Meeting of the Tyneside Naturalists' Field Club, April 21, 1849.

reappeared at a little distance, and pulling up to it they found it again lying on its side; they plied the picket a second time, and struck it a little behind the head; the picket again tore through the tender flesh by a violent effort of the fish, which escaped once more, but with diminished vigour; on the boat coming a third time alongside, the two young men putting their arms round the fish, lifted it into the boat. Signs of life remained for some time after the fish was captured, but no doubt it was in a dying or very sickly state when first discovered by the Taylors.

It was exhibited the same day in Tynemouth, North and South Shields, and brought to Newcastle next morning. In the afternoon we first saw it; we found it much injured by the strokes of the hook and by rough handling during its removals and the examinations it had undergone. The fins were a good deal torn, but the fish evidently quite fresh.

Its colour was a uniform silvery gray all over, resembling bright tin foil or white Dutch metal, except a few irregular dark spots and streaks towards the anterior part of the body. On closer inspection the remains of a bright iridescence were seen about the pectoral fin and head, the blue tint predominating.

External description.—The fish presents somewhat the form of a double-edged sword blade, being excessively compressed; its greatest thickness is decidedly nearer the ventral than the dorsal border; from the thickest part it slopes gradually to each border, the dorsal being the sharper. The length of the fish is 12 ft. 3 in., the mouth not being projected forward; immediately behind the gills it measures $8\frac{1}{2}$ in. in depth; from this point it gradually enlarges to a distance of upwards of 2 feet further back, where it attains its greatest depth of $11\frac{1}{4}$ in.; this dimension remains much the same for $1\frac{1}{2}$ ft. beyond; it then gradually but perceptibly diminishes to the end of the dorsal fin, where the depth is 3 in.

The thickness through the head at the gill-covers is 2 in., at the part of greatest depth $2\frac{3}{4}$ in.; Plate I. fig. 2 shows a section at this part. Opposite the anus somewhat less; it then gradually diminishes to the end of the dorsal fin, where it is upwards of $\frac{3}{8}$ths of an inch, fig. 3.

The fishermen state that when this fish was first taken it was all over of a brilliant silvery iridescent hue, resembling in intensity that of the fresh herring, which soon faded, and shortly after we saw it, all traces of the iridescence except those already mentioned had disappeared. The skin is covered over with a silvery matter in which no scales are visible to the naked eye, but which is most readily detached from the skin and adheres to anything it comes in contact with. Submitted to the microscope it is found to consist partly of minute convex scale-like bodies of

elongated pyramidal outline with the base rounded, Pl. I. fig. 4, which are formed of fine clear crystalline-looking filaments, arranged side by side and radiating from the apex to the base of the scale; these filaments grow much finer towards the base, where a number of minute granules are also observed. The scales remind one of some of those seen on the wings of moths. The bulk of the silvery matter of the skin, however, is made up of a soft matter finely granular, and presenting numerous transparent fragments of what have the aspect of acicular crystalline bodies. We have not been able to detect the mode of arrangement of the scale-like bodies on the skin. Round the posterior margin of the preoperculum is a broadish dusky mark on the skin, and near the top of the head above the eye a crescentic mark of a dark iridescent blue colour; besides these there are on the side of the body several narrow, dusky black, slightly waved lines considerably apart from each other and obliquely inclined from before backwards; of these eight or nine are above the lateral line and of unequal length; below the same line they are more numerous, diminishing in size on the whole till they end in mere spots at some distance behind the anus. The lower series seems to correspond in some measure to the upper. Interspersed among the lines are a few irregular spots of the same hue towards the head. The dorsal and ventral ridges are also dusky. The lateral line was at first smooth and very distinct, but after the fish had been a few days in Goadby's fluid, elongated flat scales became apparent on the line; it can be traced from the back part of the head above and behind the eye, sweeping down gradually to within $3\frac{1}{4}$ in. of the ventral margin at 18 in. from the snout; at the anus it is 2 in. from the margin; it thence runs backwards, still approaching the margin, to the caudal extremity.

Four longitudinal flattened ridges, each rather more than 1 in. broad, extend from the head to the tail immediately above the lateral line, which cuts them off very obliquely in front; the uppermost, which is the longest, running forwards almost to the eye.

The surface of the skin of the body is studded with very numerous distinct and separate tubercles of bone; the smallest and most depressed lie between the ridges and towards the ventral and dorsal margins, the largest and most elevated upon the ridges, some of these last being $\frac{1}{12}$ in. in diameter. On the ventral ridge are numerous, irregular, and prominent tubercles slightly hooked backwards. The tubercles present no regular arrangement, they are imbedded in the skin, and it is difficult to say whether or not they had been covered by the silvery matter of the skin; when we examined them, their apices were uncovered by it. Some were observed to have a perforation at the apex which was occupied by a soft papilla. The tubercles are replaced

in the neighbourhood of the head by irregular depressed indurations of the skin.

The head is small and short, measuring 9 in. from the snout to the posterior margin of the gill-cover; the outline of the lower jaw is a wide arch convex below, and stretching forwards and upwards to the mouth, which is placed in an elevated position and opens upwards and forwards; the mouth is small, nearly circular, and capable of being projected 2 or 3 in. forwards when the lower jaw is depressed. The profile of the head from the anterior end of the crest is at first suddenly concave, the concavity facing forwards and upwards, and just behind the anterior end of the curve exists the nasal chamber which is small, and owing to the damaged state of the fish we could only find one small aperture, which was longer than it was broad. Beyond this concavity the premaxillary bones project nearly horizontally to the mouth. The eye is $1\frac{1}{2}$ in. in diameter, the iris of a beautiful silvery white, and rather broader than the diameter of the pupil. The eye is situated $2\frac{1}{2}$ in. below the base of the crest and $1\frac{1}{2}$ in. behind the frontal concave profile. There is a narrow imperfect circle of a dusky colour round the contour of the eyeball. The eye is very flat. The tongue is rather prominent, but small, smooth and fixed. There are no teeth. The interior of the mouth is black.

The gill-covers are large in proportion to the size of the head, prolonged backwards, their posterior angles considerably elevated. The preoperculum has somewhat of a crescentic form, the lower border convex; the anterior horn is narrow and prolonged to its articulation with the lower maxilla, the posterior border has an obtuse angle pointing backwards. This border corresponds to and may rest upon the edge of the concavity formed by the operculum above and the interoperculum below. The operculum is on the whole broad and irregularly quadrate, with the upper anterior angle prolonged forwards and upwards; the upper margin is smooth and slightly concave nearly as far as the angle, it then curves suddenly downwards a little to the angle which is rather obtuse. Below this is the posterior border, which is somewhat sinuous and rather oblique from above downwards and forwards.

The inferior border is nearly straight, and directed upwards and forwards corresponding to the interoperculum.

The remaining bone, which we take for the interoperculum, is narrow and thin, prolonged almost to a point under the jaw and widening gradually to its posterior end, which is rounded and projects backwards beyond the preoperculum. Its lower border is convex and lies almost horizontally.

These are the only pieces observed as entering into the forma-

tion of the gill-covers. The above bones are exceedingly delicate and fragile, and present the radiating lines of development with great prominence; the silvery skin covering them is remarkable for its delicacy.

The branchiostegal rays are seven in number; the uppermost a broadish plate marked by radiating lines, the rest diminishing successively in size having the ordinary characters of such rays.

The four branchial arches diminish in size backwards, and the pharyngeal is less than the fourth branchial arch. The rays of the convexities of the branchial arches are very numerous; the concavities of these arches are beset with prominent blunt-pointed tubercles which are studded with a number of short setæ or bristles, sharp-pointed but rather soft, which project inwards towards the pharyngeal cavity. The first branchial arch has in addition a row of short pale-coloured rays or plates, the inner edges of which are also furnished with setæ which project likewise inwards. On the roof of the pharynx are two or three pairs of short laminæ (pharyngo-branchial) furnished with similar setæ, pointed backwards and downwards in the direction of the entrance to the œsophagus.

The dorsal fin extends from immediately behind the upper and posterior end of the curved frontal profile to within 3 inches of the tail of the fish. The anterior part of the fin, more prominent than the rest, is composed of twelve rays, which were stated by the captors to have been 12 or 14 inches in length when the fish was taken, and to be each furnished with a membranous expansion on its posterior edge, increasing in width upwards something like a peacock's feather.

The first ray is a pretty strong spine arising just within the frontal curve, the three next are very slender, and much closer together than the rest, and when we first saw the fish, united for 4 or 5 inches (their length at that time) by a membrane; the next is equally slender with the preceding, but rather farther apart; the three or four after this are nearly as strong as the first, the rest diminish in strength and length, and become uniform with the rays of the dorsal fin.

It is difficult for us to say whether the twelve front rays constituted a detached crest or formed merely the anterior continuation of the dorsal fin, though after careful and repeated examinations we found shreds of membrane in each interval between them, and their bases also were connected with a continuous membrane. In the interval between the twelfth and thirteenth rays the remains of a membrane were found connecting the bases of these rays, and their shafts were ragged and woolly-looking, as if a membrane had been torn off from them. We are therefore inclined to conclude that the crest was really a continuation of the

dorsal fin and not a separate structure, though it is probable enough that the ends of its rays may have been for some distance free and even furnished with a membrane on their posterior margin widening to the top, giving them the appearance of peacocks' feathers as asserted by the fishermen. This probability is heightened by the fact of the head of the *Gymnetrus* from the Cornish coast being provided with two long rays having broad membranous expansions at their ends, which would justify a casual observer in comparing them in form to the above feathers. It is not unlikely besides that the second, third, fourth and fifth rays, on account of their resemblance in delicacy to the ordinary fin-rays, may have terminated differently from the rest. The rays having been broken, we cannot say of ourselves whether they were uniform in size or not; but from what we have learnt by questioning those who saw the fish, we conclude that the middle rays were the longest, those in front and behind them gradually decreasing in length. The rays of the crest are more closely set generally than those of the rest of the dorsal fin, which stand about half an inch apart. Exclusive of the crest there are 268 rays in the dorsal fin. They terminate in fine points that project a little beyond the margin of the very delicate connecting membrane. This membrane was colourless according to the fishermen, but was bordered by a pale red when we observed it. The rays of the back are highest about the middle of the fish, where they measure upwards of $3\frac{1}{2}$ in., and at the termination of the fin are about 1 in. in height.

From the end of the fin the dorsal margin slopes rather rapidly downwards to within about an inch of the ventral margin, and is then prolonged to a rounded point at the caudal extremity. There is no caudal fin. The skin at this part, it is true, was broken, but on pressing together the broken edges they seemed to leave no hiatus. The fishermen persisted that the part was at first entire, and that there was no appendage whatever. At a distance from this point of about 2 inches along the ventral margin there exists a shallow notch. Both the margins of the fish at this part are very thin. On carefully inspecting the surface of the body, something like a series of transverse marks corresponding to the bodies of the vertebræ can be discerned, and the number of these has from this appearance been roughly estimated at about 110.

The pectoral fins are placed close behind the gill-covers, and much nearer to the ventral margin than to the lateral line, which is at least half an inch above the points of the rays of the fins; these fins are colourless, delicate, subtriangular, and the longest rays measure 2 inches. They are eleven in number and a good deal arched.

The ventral fins are represented by a pair of very strong and

straight spines, stated by the fishermen to have been 7 or 8 inches long and as if broken at the end, and furnished along the posterior edge with a delicate membrane about half an inch broad. When we saw them they were about 4 in. long, and the membrane was distinctly visible at their bases. These spines, which at their root measure about $\frac{1}{4}$ in. in diameter, project from each side of the ventral ridge immediately behind the pectoral fins, are inclined backwards, and capable of a limited lateral and backward motion. We are assured by a gentleman who witnessed the landing of the fish, that these spines were bright crimson and resembling the feelers of a boiled lobster; hence we conclude that they must have been originally flexible towards the end, and much longer than 7 or 8 in. as stated by the fishermen. The same gentleman says that the rays of the dorsal crest were simple and unbordered by a membrane.

The whole fish is remarkably delicate and tender, and easily broken when bent laterally, as shown by the injuries it has sustained by being lifted in and out of the boat, &c.; the flesh is white and fine.

Internal examination.—On opening the fish, the abdominal cavity, Pl. II. fig. 2, is found to be small, and the eye is at once arrested by the bright pale orange vermilion colour of the liver, the rest of the viscera presenting no peculiarity of tint.

The œsophagus, Pl. II. figs. 2 & 3 *a*, at first slightly funnel-shaped, soon assumes a diameter of 1 inch, and then forms a gradually increasing tube as far as the coming off of the duodenum $23\frac{1}{2}$ in. below the orifice, where it measures $2\frac{1}{4}$ in. in diameter.

Nothing like any cardia or line of demarcation between the œsophagus and stomach exists in this tract. The duodenum comes off abruptly as a short tube $1\frac{1}{2}$ in. in diameter, inclining forwards from the under surface of the stomach. The stomach, fig. 3 *b*, is continued on beyond the duodenum as a straight tube, gradually diminishing in diameter towards the posterior end of the fish, measuring an inch across opposite the anus. At this point it has the rectum or intestine lying below it, the ovaria and ureter above, the oviduct and ureter running down to the anus on its right side.

It is slightly contracted opposite to the anus, and a little beyond this enters a canal among the muscles, a continuation of the abdominal cavity, situated at about $1\frac{1}{2}$ in. from the ventral margin and with tendinous walls, to which it is pretty firmly adherent throughout. It is enlarged slightly after entering the canal, and then diminishes gradually from the diameter of rather more than an inch to the size of a crowquill. It can be traced backwards to within 1 ft. 8 in. of the caudal end of the fish, gradually approaching the ventral border and terminating in a

blunt blind extremity, Pl. II. figs. 2 & 3 *c*. The canal in which the cæcal prolongation is lodged is prolonged for an inch or two beyond the end of this latter, and contains several small blood-vessels, and the cellular coating of the cæcum arranged in cords, the vessels being gradually lost by passing backwards and outwards into the surrounding muscular tissue, the cellular cords being attached to the sides of the termination of the canal.

The anterior main part of the stomach, when laid open, was quite empty, the inner surface of the œsophagus and stomach as far as 2 in. below the pylorus perfectly uniform and smooth; from the point here indicated, the upper wall of the stomach presents the gradual beginnings of a few longitudinal plicæ, on tracing which backwards they are found to increase in number until at 5 in. in front of the anus the whole inner surface of the tube is provided with them. They are continued on in the stomachic cæcum to within 2 or 3 inches of its termination. At about halfway along this cæcum was found a small quantity of the spawn of some fish partially digested, several of the ova being still entire; a little way in front of these was an angular bit of cinder.

The pylorus, fig. 3 *d*, coming off as above mentioned from the most enlarged part of the stomach, extends for only $1\frac{1}{2}$ in., when it becomes suddenly constricted and presents internally the usual circular valve.

The duodenum, figs. 2 & 3 *e*, beyond is a cylinder of about 1 in. in diameter and 1 ft. in length, perforated all round by very numerous circular openings, the orifices of the pancreatic cæca, which measure about $\frac{1}{8}$ inch in diameter and 1 inch in length, and completely mask the whole duodenum. This part of the tube extends forwards, lying parallel to and beneath the stomach, and overlapped by the posterior lobes of the liver for about 4 in., and then emerging as it were from the pancreatic cæca is continuous with the remainder of the intestine, figs. 2 & 3 *ff*, which then is suddenly bent backwards and runs along the lower border of the pancreas obscured by the cæca of the right side, and then keeping along the floor of the abdominal cavity it passes on as a straight tube to the anus, figs. 2 & 3 *g*, at the front of which it opens separately. The diameter of the duodenum is diminished one-half at its exit from the pancreas, and the intestine continues of the same size to within an inch or two of the anus, where it is gradually lessened to about $\frac{1}{4}$ inch. The length of the intestine from duodenum to anus is 3 ft. 5 in. The inner surface of the intestine below the duodenum presents a very delicate honeycombed texture, the laminæ being fine, of varying size, and crossing each other in all directions, the largest standing up pretty high and taking a longitudinal course. This

form of valvulæ conniventes extends to within 3 or 4 in. of the anus. A few inches below the end of the duodenum was observed a delicate and transparent, but large and crescentic, membranous valve projecting into the cavity of the intestine. There is no division into large and small intestine unless the above valve point it out. No cæcal appendage except to the stomach. The intestine contained nothing but a quantity of pancreatic secretion.

Attached to the upper surface of that part of the intestine which is opposite to the pylorus is the spleen, fig. 3 *h*, ovoid in form, delicate and spongy in texture, 2 in. long by $\frac{3}{4}$ in. broad, and of a very pale reddish brown colour. Large blood-vessels run along both the upper and lower borders of the intestine below the duodenum.

The liver, figs. 2 & 3 *i*, is large, and extends 18 inches backwards from the anterior end of the abdominal cavity lying below the œsophagus, somewhat pointed in front, and becoming more bulky towards the posterior end, where it is truncated diagonally from above downwards and forwards.

The upper surface has a deep fissure partially dividing it into two unequal masses, the left being larger than the right; along this fissure run the hepatic and pancreatic blood-vessels; the gall-bladder and the cystic duct lie also attached to it.

The gall-bladder, fig. 3 *j*, about 5 in. long and $1\frac{1}{2}$ in. broad, is of an irregularly elliptical form, its long diameter corresponding nearly to the length of the fish; the cystic duct comes off from its anterior end, and running backwards parallel to it and to the hepatic duct, joins the latter just before coming to the posterior border of the liver: the common duct, fig. 3 *k*, after this runs backwards among the lower appendices pyloricæ of the left side, and debouches into the duodenum on a small papilla upwards of an inch distant from the pylorus. The gall-bladder contains a small quantity of yellow olive-coloured bile. The texture of the liver is so soft and fragile that it cannot be preserved.

The ovaria, figs. 2 & 3 *l*, lie directly above the stomach, are about 3 ft. 3 in. long, and extend forwards nearly as far as the middle of the liver. Their ends taper to points diverging slightly from each other; traced backwards they gradually increase in bulk to $\frac{3}{4}$ inch in diameter at their middle; soon after this they diminish in size, become more closely connected, and unite at 27 in. from their anterior points into one body, which tapers gradually to $\frac{5}{8}$ in. in diameter, and then curving downwards to the external orifice on the right side of the stomachic cæcum becomes rapidly smaller, and opens behind the intestine. On laying open the common tube or oviduct it is found for 2 or 3 in. from the orifice quite plain; above this, longitudinal folds of the lining membrane appear small and irregular at first, but soon

larger, more projecting, and then occupying the whole inner surface of the tube. These plicæ, which become tortuous and collected into rows of two or three together, are found to extend to the ends of the ovarian cavities, and are studded throughout with minute ova of unequal sizes in an undeveloped state.

The ureter, figs. 2 & 3 *m*, a simple tube of the size of an ordinary goosequill, runs from the external orifice, just within which is a slight vesical dilatation, fig. 3 *n*, along the median line, lying above and attached to the ovaria, and in contact with the roof of the abdominal cavity, for a distance of 1 ft. 11 in., when it perforates the fibrous membrane separating the kidney from the other viscera. It runs obliquely forwards and upwards into the kidney, fig. 3 *o*, which, inclosed in its proper cavity, extends from an inch behind where the ureter joins it as far as the cranium, a distance of 2 ft., reaching farther forward than the digestive cavity. The organ is partially and unequally cleft by a median fissure, the left side being larger than the right. Its tissue is reddish brown, spongy and friable. The posterior end of the kidney tapers to a point. The anterior end also tapers a little, but is rounded. The ureter enters the under surface of the gland and terminates by opening into the general cavity which exists along the median line of the organ. Along the upper angle of this cavity and elsewhere are the openings of small canals bringing the secretion from the uriniferous tubules. These last can be readily seen with a common magnifying glass.

The supra-renal glands, fig. 3 *p*, are two small ovoid bodies, much paler than the kidney, partially imbedded in that organ on its upper surface at a distance of 2 inches from its posterior extremity. There is no trace of air-bladder.

The heart, which is double the size of that of an ordinary cod-fish, occupies a spacious triangular cavity. Its ventricle is large, firm and triangular. The bulb of the aorta is smaller than that of the cod. The auricle is capacious and of irregular form.

The blood-vessels beyond were not examined, and we could not investigate the nervous system.

In a little blood obtained from the heart, the blood-discs, Pl. I. fig. 5, are found to vary much in size, and also in form from subcircular to elliptical and even fusiform, having their extremities or poles somewhat pointed. The nucleus is generally large and distinct, and presents several nucleoli of different sizes, giving it in many instances a granular appearance.

General remarks.—Having referred to what we have been able to find recorded respecting the genus *Gymnetrus*, we found that the figures as well as the descriptions of the external parts were very imperfect and the anatomy little known; hence we thought it desirable to make the above description fuller than otherwise

would have been necessary. Seven or eight species only have been recorded. Cuvier and Valenciennes, in vol. x. p. 365 of their 'Histoire Naturelle des Poissons,' describe one species from a manuscript in the library of Sir Joseph Banks, which is probably identical with ours, and to which they have given the name of *G. Banksii.* It was thrown up at Filey Bay, March 18, 1796, and taken to York market on the 21st. The description is as follows :—"La queue lui manquait aussi. Sa longueur était de treize pieds, son épaisseur de trois pouces, la longueur de sa tête de sept. Ses flancs étaient garnis de petites protubérances argentées disposées en séries longitudinales. La dorsale, qui s'étendait depuis la tête jusqu'à l'autre extremité, était rouge, et avait deux cent quatre vingt dix et treize rayons (les treize rayons sont sans doute ceux de la nuque) ; la pectorale en avait douze ; la ventrale un seul. Il n'y avait point d'anale ; on ne voyait point de dents ; l'intérieure de la bouche était noir ; la distance de l'anus à la bouche était de quatre pieds. Toutes circonstances qui, comme on voit, se rapprochent beaucoup de ce que nous avons observé dans nos Gymnètres de la Mediterranée*."

This description, though not conclusive, is sufficient to warrant us in adopting the name given by the French naturalists, and thus to avoid running the risk of adding uselessly to the list of synonyms.

Another species is described in the same work, vol. x. p. 298, under the name *Gymnetrus Gladius,* which very much resembles our specimen ; besides however some minor differences, the upper border of the operculum differs materially—in the former it is convex, and presents three angular points ; in the latter it is smooth and concave†.

There are two Norwegian species which appear generally to precede or accompany the shoals of herrings, and hence are called "King of the Herrings." Of these, the *Regalecus Glesne* of Ascanius (*G. Ascanii* of Shaw) seems to be the most nearly allied to our fish, but it is distinguished from it by the following marks. It is 10 ft. long and 6 in. deep ; its length is therefore to its depth as 20 to 1. From the measurements given in the former part of this paper, it will be seen that our fish is 13 times longer than it is deep. This has 268 rays in the dorsal fin ; that 120.

Again, the *G. Ascanii* is devoid of the transverse dusky streaks

* It has not been in our power to refer to the work here mentioned ; but to the kindness of Mr. Adam White of the British Museum, who called our attention to the above record, we are indebted for this extract, and also for another relative to *G. Gladius.*

† The *G. Telum* of the same authors is also different from our fish, this having 268, that 398 rays in the dorsal fin.

on the anterior part of the body so characteristic of our species, but is furnished with longitudinal rows of minute dusky spots, and has moreover three broad dusky bands across the posterior part of the body behind the anus, and its forehead is white; it is also described as having teeth; the crest also probably differs, if the figure given in the 'Encyclopédie Méthodique' be correct; the dorsal fin is continued round the caudal extremity for a little distance along the ventral line, being somewhat elongated at the extremity, forming a kind of caudal fin. The gill-membrane has only four or five rays. Thus, though there is a striking general resemblance, there are several important points of distinction between the *G. Ascanii* and the *G. Banksii*.

The other Norwegian species named *G. Grillii* (Lindroth, Nouvelles Mémoires de Stockholm, xix. pl. 8) is noticed in Griffith's 'Cuvier' as being 18 ft. long, and having upwards of 400 rays in the dorsal fin, and we conclude therefore that it also is distinct from our species*.

Of the so-called Indian species, one, the Russellian, described as a probable variety in vol. iv. pt. 2 of Shaw's 'Zoology,' is only 2 ft. 8 in. long, and has 320 rays in the dorsal fin, and differs in several other respects.

The other is the Blochian Gymnetrus of Shaw, the *G. Hawkenii* of Bloch, the figures of which are incorrect. This however in all probability ought not to be considered as an Indian species. The history of it, as far as we can gather, is as follows:—

It appears that on the 23rd February, 1788, a species of *Gymnetrus* was drawn on shore in a net at Newlyn in Cornwall, and all that is really known of it is obtained from a figure with notes which was in the possession of the late Mr. Chirgwin of Newlyn, who freely granted permission to Mr. Couch of Polperro to have a copy taken of it. Through the kindness of Mr. Couch we have been favoured with a reduced copy of the above figure made by Mr. Thomas Q. Couch; and in the letter accompanying the drawing Mr. Couch states that Mr. Chirgwin assured him that his figure was the only true original, the fish having been drawn ashore not far from his house; that however they might differ, all other figures were copied from his, and that the note written on his figure is the only one originally made from the specimen. Mr. Couch further says, that he has no doubt, from circumstantial evidence, that the figure and account of the *G. Hawkenii* were communicated to Bloch by a Mr. John Hawkins, brother of the late Sir Christopher Hawkins, Bart. Mr. Hawkins himself, as Mr. Couch concludes from Mr. Chirgwin's remarks, did

* We have since been informed by Mr. J. E. Gray that *G. Grillii* has the same number of rays and the same dark cross bands on the anterior part of the body as the Cullercoats fish.

not actually inspect the fish. The copier of the figure sent to Bloch appears to Mr. Couch to have committed a great mistake by attempting to correct one which he supposed to have been made by the original draftsman, and the mistake consists principally in his having removed the two filaments in front of the dorsal fin to the situation of the ventral fin, thus making four filaments there instead of two. The same mistake appears to have been made with regard to the figure of the *G. Hawkenii* in Yarrell's 'Fishes,' that figure being, as Mr. Yarrell informs our friend Mr. Alder, incorrect as regards the number of ventral filaments, and the addition of the caudal fin.

It appears therefore that the *G. Hawkenii* of Bloch is simply the fish caught at Newlyn incorrectly copied. In the notes appended to the drawing sent us by Mr. Couch, and which are copied from the original, are merely mentioned the date of the capture as above and the measurements; "its length without the tail, which it wanted, was $8\frac{1}{2}$ ft., its extreme breadth $10\frac{1}{2}$ in., and its thickness but $2\frac{3}{4}$ in."

Its proportions therefore, allowing the tail to be somewhat deficient, come pretty near to those of our fish; if the drawing however is to be relied on, it differs from ours in having only two filaments from the head with expanded feather-like extremities, and in having the ventral processes like those of the head. The fins also are crimson, and the body is marked all over by delicate roundish spots, and has a few obscure streaks obliquely placed below the lateral line.

On the whole then we are inclined to believe the Cornish specimen distinct from the *G. Banksii*, though, from the evident want of knowledge of the draftsman, much reliance cannot be placed on his details.

Notwithstanding the rarity of the genus *Gymnetrus*, there is every reason to believe that specimens of it have been taken from time to time off the north-eastern coast of England. It appears by the 'Annual Register' that a fish was captured off Whitby, January 22, 1759, closely related to, if not identical with our species. The account, which may be interesting, we here reproduce. It is by Lionel Charlton, author of a 'History of Whitby':—

"Yesterday (Jan. 22) a very extraordinary fish was brought here by our fishermen, which broke into three pieces as they were hauling it into the coble. It was 11 ft. 4 in. long, exclusive of the tail, had a head like a turbot or brat, was about a foot broad near its head, but not above 4 or 5 in. near the tail, and not anywhere more than 3 in. thick. The thickest part was its belly, and it gradually diminished away towards the back, which was sharp, and had all along it one continued fin from the head to the tail. It was covered with an infinite number of white scales which stuck to

and dyed everything that it touched; and might be said in some sort to resemble the quicksilvered back of a looking-glass. It appeared when laid on the sand like a long oak plank, and was such a fish as nobody here ever saw before, which caused a vast concourse of people round it the whole day."

The breaking of the fish was owing to its great delicacy of structure, and probably its little capacity for lateral motion. It was necessary to take great care in removing the Cullercoats fish for fear of fracture from the same causes.

We are informed by Mr. Stanton of Newcastle, that upwards of fifty years ago a silvery fish resembling in its general characters the subject of this paper was exhibited here, and we have been favoured by Mr. Robert Bewick with a copy of a hand-bill relating to a fish shown in this town March 27, 1794, undoubtedly referring to the specimen seen by Mr. Stanton. It is as follows:—"To be seen at Moses Hopper's, Flesh Market, a most curious fish taken at Newbiggen by the Sea, 10 ft. long, 1 ft. broad, 2 in. thick, and is thought to be the greatest curiosity that was ever seen in the kingdom before."

This fish was sketched by our celebrated townsman Thomas Bewick, but unfortunately the sketch has been mislaid.

We have lately been favoured with a letter from Mr. George Tate of Alnwick respecting a fish of this genus, from which we make the following extract:—"A fish was exhibited in January or February of the year 1845, similar in its general form to that, a drawing of which you showed me when I was last in Newcastle. One of the Preventive Service men observed this fish lying in a shallow pool in the sands about a mile south of Alnmouth, where it had been left by the receding tide. Its great length and unusual appearance at once raised the man's curiosity and excited his fears. On approaching it the creature bent itself round so as to appear like the rim of a coach-wheel, and the man supposing it was about to dart upon him drew his sword and struck it on the head. The fish struggled much, but the man striking it repeatedly at length succeeded in cutting off its head.

"This fish was 16 ft. long, 11 in. deep, and about 6 in. thick at the thickest part, from which it very gradually diminished both in thickness and depth. The eye was large, measuring about 5 in. in circumference. The teeth very small and very acute. The skin was smooth, and no pustulations or hard points were observed, neither were any transverse streaks noticed; but there were a few longitudinal ridges or corrugations about half an inch apart along the sides. The colour was a silvery gray, and the skin was covered by minute silvery-looking scales or particles, which were in such great quantity, that in the course of the struggles the creature made after being struck, the spot where it

was found was covered over with them. There were no pectoral or ventral or anal or caudal fins, neither was any crest observed. These however may have been broken off, as the head was much injured by the blows which it has received. One fin, of a rich dark crimson colour, extended uninterruptedly from the neck along the back to within a few inches of the tail, which ended in an obtuse point. The fish was very beautiful; the large eye, the rich, crimson, rayed fin cresting its back, and the bright silvery hue of its body rendered it a striking and attractive object." The fish thus described by Mr. Tate, it will be seen resembles rather the *Regalecus Glesne* in its having teeth and being devoid of the transverse streaks.

The following account of the capture of two fish of this genus has been taken down by us from the oral relation given by John Blackett Anderson, of Walker near Newcastle. He states he recollects the taking of two fish about fifty years ago at the outer Fern Islands. They were left by the tide in a shallow pool, and a signal being made by the keeper of the lighthouse, a boat went from the shore and brought them to Bambrough. They were sick when taken. One was about 4 ft. longer than the other, the larger specimen was 18 ft. long. It could not be less, for it was as long as the breadth of a house-end which measured 18 ft., and against which it was laid out on a bench. The fish were about a foot deep, and were flat; their colour was silvery, like a silver fish, but not so white. There were four processes about 18 in. long from the head, of a red colour, like the feelers of boiled lobsters; they tapered gradually towards their ends, which were enlarged to the form and size of a large button. Thinks these specimens occurred in spring. They were kept till putrid, and then thrown away. They excited much interest throughout the neighbourhood. Recollects them well, for he was living then on the spot. Has not seen the Cullercoats fish.

We have moreover learnt from a Norwegian captain who frequents this port and has traded to Archangel, that in the White Sea, fish closely resembling the Cullercoats one are occasionally seen, the silvery colour, long attenuated form, and rapid undulating motion being their chief characteristics. They are there called Stone Serpents.

It has occurred at once to many here and to ourselves also on first viewing this *Gymnetrus*, that it may possibly have been taken for the famous Sea Serpent. The Archangel name of the fish seen there, strengthens the idea that it may at times have deceived the eye of some credulous mariner, from its rapid undulating motion, linear form, and from its occasionally appearing at the surface, and leaving a lengthened wake behind it, thus creating an exaggerated idea of its extent.

On consulting however the accounts which have appeared of the Sea Serpent, we find that they relate in most instances to creatures widely different from the Ribbon Fish, such as whales, seals, sharks, &c. seen under disadvantageous circumstances or imperfectly observed. Still, though the *Gymnetrus* may not have originated the idea of the existence of a marine serpent, we think it not improbable that the occasional appearance of this fish may very materially have tended to keep up among the Norwegian fishermen that faith which they are stated to hold in the existence of such a monster.

Of the habits of the *Gymnetrus* little can be said. The delicate general conformation of the body, the smallness and tenderness of the mouth, the absence of teeth, the delicacy of the fins, show clearly that it is a fish not organized for attack—the dorsal crest and the ventral processes being obviously for the purpose of balancing the body, and not for either attack or defence. Its means of defence may consist partly in the bone-studded skin, but chiefly in the adaptation for flight, evidenced in the compressed form of the body and in the great length and power of the tail. The small amount of half-digested food found in the stomachal cæcum goes so far to prove the non-rapacious habits of the *Gymnetrus*, and make it probable that its habitual food is confined to the spawn of other fish, and the soft, small, and defenceless inhabitants of the deep. The absence of air-bladder seems to indicate the sea-bottom as the natural resort of this fish, where its food would be most abundant.

The only evidence of its being indigenous on the north-eastern coast rests in its having been observed six times since 1759. There is little doubt of the remarkable circumstance that all the six have been captured during the spring months.

In conclusion, we have only to state, that the fish is now in the possession of Mr. Edward Whitfield of Newcastle, who kindly granted us permission to make the necessary examinations, and we are happy in being able to state that that gentleman has expressed his intention of presenting this rare fish to the museum of the Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne.

Since writing the above we have received a pamphlet entitled "An Account of the Rare Fish, *Regalecus Glesne*, caught off Cullercoats," &c. In it we find a copy of a figure of a *Gymnetrus* taken at Newlyn in Cornwall on Saturday 23rd day of February 1788. This figure, with descriptive notes appended, is bound up at the end of a copy of Pennant's 'British Zoology' in the Banksian library. Mr. J. E. Gray supposes this figure and notes to be the authority for the various descriptions and figures of the

Cornish specimen of *G. Hawkenii*. The Banksian figure, though possessing a good general resemblance to a *Gymnetrus*, differs so widely from the figure we have been favoured with by Mr. Couch, that we believe neither of them to have been a copy of the other, and the differences in the measurements that accompany the figures are such as to strengthen this belief; the length of the Banksian specimen is said to be 8 ft. 10 in., Mr. Couch's $8\frac{1}{2}$ ft. The depth of the former is 10 in., of the latter $10\frac{1}{2}$ in.; the thickness of the former $2\frac{1}{4}$ in., of the latter $2\frac{3}{4}$ in. These discrepancies could scarcely have arisen from errors of copying, but are more likely to be the result of examinations by different observers. It would therefore appear that there must either have been more than one fish caught on the Cornish coast, or else that different drawings and descriptions have been made of the same specimen.

The figure in the pamphlet does not appear to us materially to elucidate the species of the Cornish fish; indeed the details both of the figures and descriptions are so imperfect that they may quite as readily be taken for the *G. Gladius* as for the *G. Banksii*; the spotting of Mr. Chirgwin's drawing brings strongly to mind the markings of the *G. Gladius*.

We are glad to be able, from a letter of Mr. Yarrell in the above pamphlet, to add to the list of specimens now put on record one which was cast on shore alive at the village of Crovie near Macduff, after a severe north-easterly gale in March 1844. It is thus described:—"Length without the tail, which was wanting, 12 ft., greatest depth 12 in., greatest thickness $2\frac{3}{4}$ in. The dorsal fin was $2\frac{1}{2}$ in. in height, and extended to the back of the head to a point near the tail. Rays in the dorsal fin apart from its anterior elongation on the head 264. Filaments rising from the head 15; the longest measuring 27 inches. They were connected at the base by a thin membrane similar in consistency to that which connects the rays of the dorsal fin, and are evidently a continuation of that fin. The pectoral fin is $2\frac{1}{2}$ in. long, the rays 12 in. The ventrals consisted of two filaments 3 ft. in length. They were fringed with a thin membrane on two sides, and had evidently been broken. The head was 9 in. long from the point of the lower jaw to the end of the operculum. The whole body was covered with a delicate silvery white membrane, under which appeared a series of tuberculated and smooth bands extending over the whole length of the body; twelve of these bands occupied the space above the lateral line. When the fish was in a fresh state these bands did not appear distinctly, but when the skin was taken off they appeared distinct enough. Behind the pectoral fins appeared a few narrow dark bands extending across the fish; these were quite distinct when the fish was in a fresh state,

but the skin does not retain a trace of them. The dorsal fin had an orange tinge, and the lateral line extended along the lower third of the body. The distance of the vent from the end of the operculum was 46 inches."

We agree at once with Mr. Yarrell in pronouncing this to be the same species as the Cullercoats fish, and it is confirmatory of our opinion that the crest was really a continuation of the dorsal fin. This Scotch specimen, like the English ones, was caught in the spring, and makes the eighth British example of this fish, which is therefore not so extremely rare as has been supposed.

We observe that in the last Number of the 'Annals' Professor J. Reid of St. Andrews has given a highly interesting description of what he believes to be the first British example of the Deal fish, and we take the present opportunity of stating that in the Newcastle Museum there is a specimen which was taken at Newbiggen on the Northumberland coast, June 18th, 1844. This specimen is 5 ft. 5 in. long, and has 1 ft. maximum depth. The body was of a silvery gray, the dorsal fin and tail red.

EXPLANATION OF PLATES I. AND II.

PLATE I.

Fig. 1. Anterior portion of *Gymnetrus Banksii*, the jaws being slightly protruded; the dotted lines on the crest and ventral processes represent these parts as they are believed to have been originally, the continuous lines represent them as they were seen by us.

Fig. 2. Outline of section of body at part of greatest thickness, showing the relative depth and thickness.

Fig. 3. Outline of section of ditto, showing ditto ditto at 3 or 4 in. from tail.

Fig. 4. Two of the radiated scale-like bodies from the silvery matter of the skin.

Fig. 5. Different forms of blood-globules, some shown on edge.

PLATE II.

Fig. 1. Side view of *G. Banksii* in outline.

Fig. 2. Side view of ditto, abdomen laid open, showing the viscera *in situ*: *a*, œsophagus; *c c*, cæcal prolongation of stomach; *e*, pancreatic cæca covering duodenum; *f*, intestine; *g*, anus; *i*, liver; *l*, ovaria; *m*, ureter.

Fig. 3. Plan of viscera removed from body: *a*, œsophagus; *b*, stomach; *c c*, stomachic cæcum; *d*, pylorus; *e*, pancreatic cæca surrounding duodenum; *f*, intestine; *g*, anus; *h*, spleen; *i*, liver; *j*, gall-bladder; *k*, ductus communis choledochus; *l*, ovaria; *m*, ureter; *n*, vesical dilatation of ditto; *o*, kidney; *p*, supra-renal bodies.

II.—*Ornithological Notes.* By JOHN BLACKWALL, F.L.S.

[Continued from vol. xix. p. 379.]

THE GREAT GRAY SHRIKE, *Lanius excubitor.*

REMARKABLE for the boldness and fierceness of its disposition, this species of shrike is sometimes troublesome to birdcatchers